

Name: _____

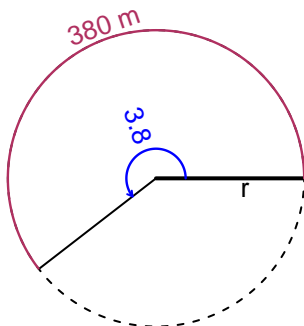
Date: _____

Trig Final (SLTN v625)

- You can use a calculator (like [Desmos](#))
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 380 meters. The angle measure is 3.8 radians. How long is the radius in meters?

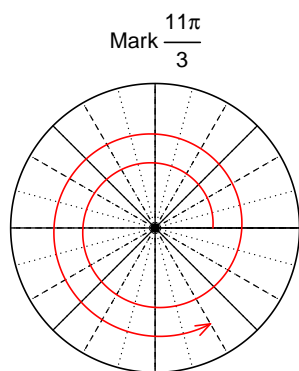


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 100$ meters.

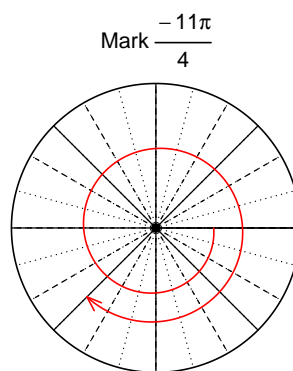
Question 2

Consider angles $\frac{11\pi}{3}$ and $-\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{3}\right)$ and $\sin\left(-\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/3)$

$$\cos(11\pi/3) = \frac{1}{2}$$



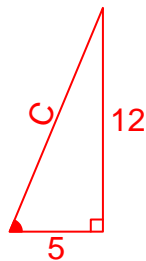
Find $\sin(-11\pi/4)$

$$\sin(-11\pi/4) = -\frac{\sqrt{2}}{2}$$

Question 3

If $\tan(\theta) = \frac{-12}{5}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



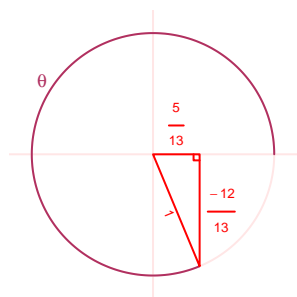
Solve the Pythagorean Equation

$$5^2 + 12^2 = C^2$$

$$C = \sqrt{5^2 + 12^2}$$

$$C = 13$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-12}{13}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -2.36$ meters, an amplitude of 8.31 meters, and a frequency of 4.03 Hz. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.31 \sin(2\pi 4.03t) - 2.36$$

or

$$y = -8.31 \sin(8.06\pi t) - 2.36$$

or

$$y = -8.31 \sin(25.32t) - 2.36$$